

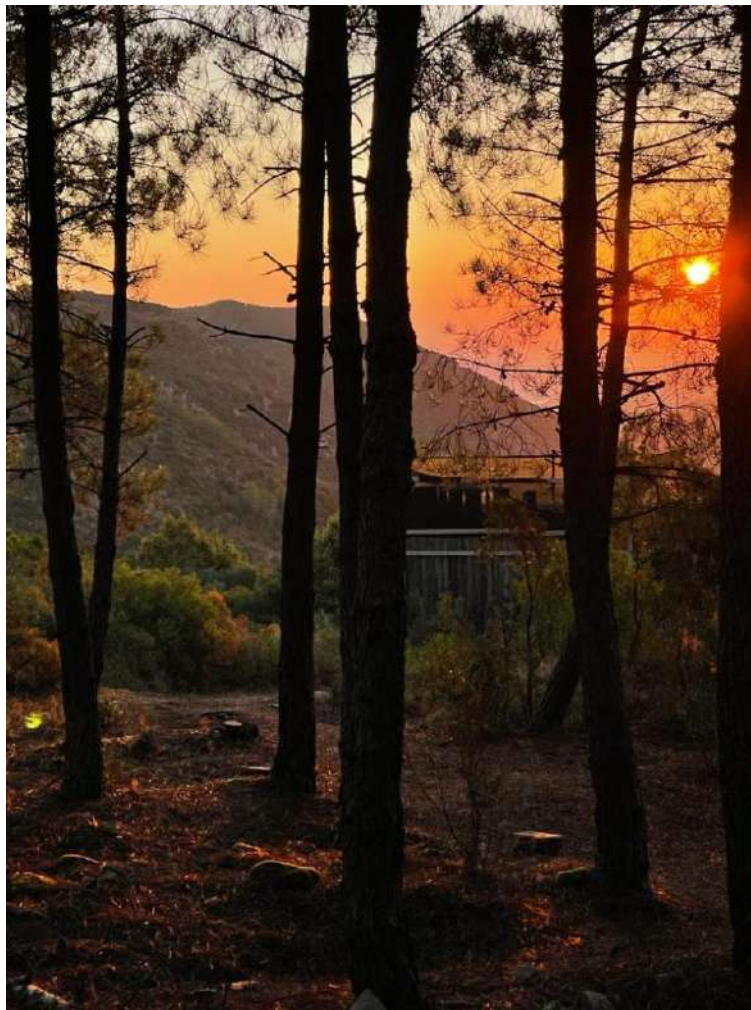


Aquila a-Life

Reintroduction of Bonelli's eagle in Sardinia



**Action C.2**  
**REFORZAMIENTO POBLACIONAL**  
**C.2.2 Reintroduction in Sardinia**



ISPRA

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## **LIFE PROJECT “AQUILA a-LIFE” (LIFE16 NAT/ES/000235)**

### **BONELLI’S EAGLE (*Aquila fasciata* Vieillot, 1822) REINTRODUCTION IN SARDINIA**

**Azione C.2.2:** Reintroduction in Sardinia. Report 2021, Elisabetta Raganella Pelliccioni, Massimiliano Di Vittorio, Vasco Avramo, Riccardo Nardelli, Lorenzo Serra, Fernando Spina.

According to a formal agreement with ISPRA, Forestas Agency set up the cage.

Thanks to Caterina Funghi, Andrea Marcon, Andrea Roncalli for their precious collaboration during hacking and release, and to Dr Marco Muzzeddu for the successful rehabilitation of the eagle Bonaria.

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*Responsibility for the information and views set out in this report lies entirely with the authors.*

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## Annex I

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## 1. LOCATION OF THE HACKING CAGE

For the fourth year, the cage set in the first selected release site, Crastazza, Tepilora Regional Park, was used for hacking. The cage stands within an area patrolled by Forestas state agency, which has proven to be a secure site and suitable also for optimal post release observation. Although access to the site was restricted and controlled by Forestas personnel, both during day and night, we kept four camera traps along the main tracks towards the cage; these camera traps didn't detect any intrusion by humans. Occasionally, the presence of sheep, wild boar (*Sus scrofa*) pine marten (*Martes martes*) and fallow deer (*Dama dama*) was recorded. No dogs were detected in 2021. Regional Forestry Corp was also involved during the hacking phase, in order to intensify the patrolling of the whole site.

The cage was built up according to technical instructions from Grefa, which also supervised (J.J. Iglesias) the operations at a later stage of construction and offered advice for the location of the outer platforms. Two feeding platforms were available inside the aviary as well as two drinking points. Overall three inspection windows with tinted glasses were available, two in the nest and one in the main cage. In the nest, two camera traps were also set, recording three min videos every ten minutes. Before the start of the 2021 hacking season, the cage was checked by Forestas personnel and fixed, if and where needed. Some maintenance works of the cage involved the arrangement of the perching trunks, maintenance of the wooden wall and minor interventions for the proper allocation of the camera traps.

Outside the cage, as usually, five feeding platforms, provided with camera traps, were set up and no drinking point. A drinking point was not needed given several natural water points were available close to the cage in the main valley, notably one along the river down the cage. These natural water points were also used by the eagles for bathing.

## 2. INDIVIDUAL HISTORIES

In 2021 the hacking season started on the 16<sup>th</sup> of May with the arrival of the first 3 eaglets (Lia, Prisco, Nino) from Sicily. (Tab.1) A second group from Grefa arrived on the 5<sup>th</sup> of June (Yorgi, Babbu Mannu, Bonaria). The animals from Grefa were tagged before their translocation with E-obs GPS, which were set observing the same sampling schedule applied by the other partners of the project and marked with coloured metal rings with individual alphanumeric codes readable in the field (base color yellow with black inscriptions). Upon arrival in Tepilora RP, they were also ringed with metal rings issued by the Italian ringing center ISPRA (Fig.1). The eagles proceeding from Sicily were tagged and ringed upon capture in the wild with the same devices, as part of the activities foreseen within the Conrasi Life project.

Year	Release site	Name	Origin	Sex	Birth date	Arrival date	Release in nature	Release age (days)
2018	Tepilora RP	Abbaluchente	LPO	F	04/05/2018	29/06/2018	20/08/2018	108
2018	Tepilora RP	Helmar	LPO	M	05/05/2018	29/06/2018	20/08/2018	107
2018	Tepilora RP	Posada	LPO	F	07/05/2018	29/06/2018	20/08/2018	105
2018	Tepilora RP	Tepilora2	LPO	F	09/05/2018	29/06/2018	20/08/2018	103
2018	Tepilora RP	Nurasè	Grefa	F	29/05/2018	24/07/2018	20/08/2018	83
2018	Tepilora RP	Saccaia	Andalucia	F	10/04/2017	15/07/2018	21/12/2018	
2019	Tepilora RP	Muscatoglio	Andalucia	M	02/03/2019	27/04/2019	15/06/2019	109
2019	Tepilora RP	Artaneddu	Andalucia	M	27/02/2019	27/04/2019	15/06/2019	112
2019	Tepilora RP	Prenna	Andalucia	F	25/02/2019	27/04/2019	15/06/2019	114
2019	Tepilora RP	Illiorai	Andalucia	M	11/03/2019	27/04/2019	15/06/2019	100
2019	Tepilora RP	Pratteri	Grefa	M	09/03/2019	27/04/2019	15/06/2019	102
2019	Tepilora RP	Battore	Agrigento	M	17/03/2019	12/05/2019	15/06/2019	94
2019	Tepilora RP	Ichnusa	Valencia	F	19/03/2019	13/07/2019	26/07/2019	129
2019	Tepilora RP	Inoche	Grefa	F	19/04/2019	13/07/2019	26/07/2019	98
2020	Tepilora RP	Mantzena6	Grefa	M		04/08/2020	02/09/2020	
2020	Tepilora RP	Dure7	Grefa	M		04/08/2020	02/09/2020	
2020	Tepilora RP	Sadonna	Andalucía	F	14/04/2020	04/08/2020	02/09/2020	141
2020	Tepilora RP	Arcantzelu	Grefa	M	02/05/2020	04/08/2020	02/09/2020	123
2020	Tepilora RP	Zoseppe	Grefa	M	14/04/2020	04/08/2020	02/09/2020	141
2020	Tepilora RP	Minnena	Grefa	F	05/05/2020	04/08/2020	02/09/2020	120
2020	Tepilora RP	Arroyto	LPO	F	29/04/2020	04/08/2020	02/09/2020	126
2021	Tepilora RP	Lia	Sicilia	F	18/03/2021	16/05/2021	01/08/2021	136
2021	Tepilora RP	Prisco	Sicilia	M	23/03/2021	16/05/2021	01/08/2021	131
2021	Tepilora RP	Nino	Sicilia	M	30/03/2021	16/05/2021	01/08/2021	124
2021	Tepilora RP	Yorgi	Grefa	M	07/04/2021	05/06/2021	01/08/2021	116
2021	Tepilora RP	Babbu Mannu	Grefa	M	11/04/2021	05/06/2021	01/08/2021	114
2021	Tepilora RP	Bonaria	Grefa	F	09/04/2021	05/06/2021	01/08/2021	112

**Tab. 1** List of the Bonelli's eagles hacked from the beginning of the project in Crastazza (NU). Coloured rings are yellow with black inscriptions. Eagles were also fitted with metal rings and GPS-tags.



**Fig.1** Ringing the eagles from Spain at the hacking site (Ispra and Anthus)

To make the nest available for the second group of eagles arriving on 5<sup>th</sup> June, the nest was open on June 1<sup>st</sup>. Two of the eagles (Lia, Nino) came out immediately in the cage, while Prisco - despite not being the youngest - remained in the nest, which was closed again to host the incoming last eagles. While in the nest, the eagles showed high level of tolerance, with limited interactions. Similarly, the eagles in the cage didn't show interest towards the birds already in the nest. The nest was definitively open on 15th June, but Bonaria abandoned it a week later (Fig. 2). Unfortunately, during the night of 30th July, i.e. close to the expected release day, three eagles had to be captured by means of a handle net due to an unexpected but necessary check to their E-obs devices. They were released in the cage few minutes after capture and handling. Release in nature was postponed in order to reduce any effect of the stress possibly caused by handling.



**Fig. 2** Bonaria in the nest while the other eagles are perching in the cage

As usually, the name for the all eaglets was chosen by Forestas team who built up the hacking cage. The arrival of the eagles from Sicily (Fig.3) was also a communication event: at the port of Cagliari, waiting for them, there were the Forestry Corp, the Councillor for Environmental Protection of Sardinia Region, the head and the wildlife technician of Forestas, beside the vets in charge of sanitary inspection and documents check (present as usual) and ISPRA personnel. The event was followed by local press and media; the Councillor was interviewed and the interview is available on the regional web site (<https://www.regione.sardegna.it/j/v/2568?s=423347&v=2&c=149&t=1>). Posts on Facebook to highlight the new hacking season were published by Ispra and Forestas as well.



**Fig. 3** The start of hacking season 2021. The arrival of the first eagles from Sicily.

### **3. HACKING AND RELEASE**

#### **3.1 Feeding**

During hacking, the birds were fed with quails (Common quail *Coturnix coturnix*, and the smaller Japanese quail, *Coturnix japonica*). The daily ration provided changed according to the weight of the prey and age of the eagles also considering that prey consumption strongly decreased in the hottest days..

All prey items were carefully checked by Forestas vets before being delivered to the eagles; eagles were fed with approx. 1,5 quail/eagle/day (or quails equivalent) on average.

When all eagles were in the main aviary and around the age for hunting attempts (82-92 days of life), roughly 15 days before release, live preys have been provided. All eagles regularly killed the quails; some of them (Yorgi, Babbu mannu) showed remarkable hunting capabilities, while others (Bonaria in particular) showed a tendency to wait and eat from prey leftovers. Although this behavior is not associated to poor hunting efficiency in nature, it cannot be excluded that it affected Bonaria's performance immediately after release.

During both nest and aviary occupancy stages, the animals were monitored during the day to check food consumption by all of them; they were fed daily but food was adjusted in relation to the degree of consumption of previously given preys. All of them fed mainly in the morning, while in the hot hours of the day all activities remarkably decreased.

After release, no live preys were put on the platforms outside the cage, as in the previous years. This decision is related to the risk of attracting golden eagles and crows visiting the area, as well as to animal welfare issues, difficult to deal with. However, as observed, this choice doesn't seem to have affected in any way the hunting ability or the post-release survival of the released eagles. Feeding platforms were supplied with fresh meat every one-two days, according to GREFA protocol, and were frequented by eagles and other species (Fig. 4). Among the eagles released in 2021, only Babbu Mannu and Yorgu repeatedly fed on the platforms, while all the others – that in any case left quite soon the release site – were never recorded by the camera traps.

Unlike previous years, camera traps allowed to verify the presence of other predators which took advantage of the provided dead preys (quails) on the feeding platforms. Indeed, platforms were visited by two pine martens that were able to climb and reach the platform, stealing the prey. To prevent this behavior, we tried to put obstacles under the platform (branches of the thorny plant *Calycotome spinosa*, or a leave-covered overturned funnel). However, all these attempts were unsuccessful; in order to limit prey consumption by pine martens we therefore decided to supply the platforms with preys at sunrise, when the activity of the martens is normally reduced. In addition, preys were stolen by a young Sardinian goshawk (*Accipiter gentilis arrigonii*) and by Pratteri, a male bonelli's eagle released in 2019.



a



b



c



d

**Fig. 4** Visits at the feeding platforms. a: Babbu Mannu; b: Pratteri; c: a pine marten on a feeding platform; d: young Sardinian goshawk.



### **3.2 Behavior in the cage**

As already observed during the hacking of the previous years, the 2021 eagles showed scarce interactions between them and low vocalization rate in the cage, both in the nest and in the main aviary. Eagles spent most of the time resting, while flapping activity increased with time. Flapping events increased while approaching release. The nest was constantly used by the birds and the tree trunk inside was strongly used by all eagles, particularly for flapping, as occurred also in previous years. During windy days before the release, the birds frequently stretched their wings imitating gliding flight or practiced lifting by wing flapping.

All eagles showed a good state of alert, demonstrating a strong intolerance towards "external" disturbances (for example noises, distant human voices, etc.). When approaching release, the Sicilian eagles, and particularly the female (Lia), showed significant level of restlessness and a high interest in the surrounding environment.

### **3.3 Release in nature**

The animals were released together on August 1th. The first eagle left the cage at 5.49 followed by other three (probably Lia, Prisco, Nino, Yorgi), approximately within one hour from gate opening. Probably Babbu Mannu left the cage around 6.00 am while Bonaria waited longer and got out at 9:00.

Three eagles (Nino, Prisco, Lia) out of six, abandoned the valley where the cage is located within few days after release, Babbu Mannu and Yorgi remained longer around the cage, together with Pratteri. Pratteri was observed interacting quite often with Babbu Mannu, and several time the latter was spotted spending the night inside the cage.

On 5<sup>th</sup> August, Bonaria moved towards east and showed more and more short movements within narrow forested valley. On August 11<sup>th</sup> we attempted to capture the eagle, but the thickness of the forest couldn't allow to properly locate the animal. On the 12<sup>th</sup> Bonaria was caught in the dense undergrowth of a pine wood, where the eagle was unable to move. She was immediately transferred to the rehabilitation centre of Bonassai for health checks. The radiography clearly showed a fracture of the left femur. She had surgery on 16<sup>th</sup> August; the injured leg was treated by ligature and insertion of a traction iron during surgical operation. She was back in the aviary (first in the nest and then in the aviary) until September 23d, when, after several check by the vets, she was released again after a full recovery (see Annex I for images). During the permanence of Bonaria in the cage, Pratteri and Babbu Mannu often perched on the cage, with frequent vocalizations. No interaction was observed between our Bonelli's eagles and the three local golden eagles (a pair with a juvenile) occurring in the valley of the cage.

**ANNEX I**



Bonaria soon after recapture



Radiography showing the multiple fracture of the left femur.



Release from the nest



Bonaria in the nest after surgery